CLAIMS

What is claimed is:

1. A method of decomposing a complex distribution of data, comprising the steps of:

modeling the complex distribution as a sum of discrete simple distributions; and

processing the simple distributions independently.

2. The method of claim 1, wherein the processing step comprises manipulating and interpreting the simple distributions independently.

3. The method of claim 1, wherein the modeling step comprises executing an evolutionary algorithm.

4. The method of claim 1, wherein the processing step comprises executing an evolutionary algorithm.

5. The method of claim 2, wherein:

the interpreting step comprises identifying the simple distributions that are spurious; and

further comprising the step of:

reconstructing the complex distribution by summing the simple distributions that are not spurious.

6. The method of claim 1, wherein the complex distribution comprises well logging data generated from measurements of one or more parameters of a subsurface formation.

7. The method of claim 6, wherein the well logging data comprises measurements that are representative of one or more natural phenomena.

8. The method of claim 6, wherein the well logging data comprises measurements that are representative of one or more physical processes.

9. The method of claim 1, wherein the simple distributions comprise one or more statistical distributions.

10. The method of claim 1, wherein the simple distributions can each be characterized by a reduced data set.

11. The method of claim 10, wherein the simple distributions comprise one or more statistical distributions that can each be characterized by an amplitude, mean, and standard deviation.

12. A method for transmitting measured wellbore data from a subsurface location to a surface location, comprising the steps of:

modeling the measured wellbore data at the subsurface location as a sum of discrete simple distributions that are capable of being represented by a relatively small number of parameters;

transmitting the representative parameters from the subsurface location to a surface location; and

reconstructing the measured wellbore data at the surface location using the transmitted parameters.

13. The method of claim 12, wherein the simple distributions are statistical distributions.

14. The method of claim 13, wherein the statistical distributions are normal distributions that capable of being represented by an amplitude, a mean, and a standard deviation.

15. A method of acquiring subsurface formation data, comprising the steps of:

disposing a formation evaluation tool in a wellbore penetrating a subsurface formation of interest;

acquiring formation data with the formation evaluation tool, the acquired data representing a complex distribution;

modeling the complex distribution as a sum of discrete simple distributions; and

processing the simple distributions independently.

16. The method of claim 15, wherein the processing step comprises manipulating and interpreting the simple distributions independently.

17. The method of claim 15, wherein the modeling step comprises executing an evolutionary algorithm.

18. The method of claim 15, wherein the processing step comprises executing an evolutionary algorithm.

19. The method of claim 16, wherein:

the interpreting step comprises identifying the simple distributions that are spurious; and

further comprising the step of:

reconstructing the complex distribution by summing the simple distributions that are not spurious.

20. The method of claim 16, wherein:

the interpreting step comprises identifying the simple distributions that are spurious; and

further comprising the step of:

mapping the formation about the wellbore as a function of vertical depth according to the simple distributions that are not spurious.

21. The method of claim 15, further comprising the steps of:

from a location within the wellbore, characterizing each of the simple distributions with a substantially reduced data set; and

transmitting the substantially reduced data sets to the surface from the wellbore location.

22. The method of claim 21, wherein:

the simple distributions comprise one or more statistical distributions; and

each of the statistical distributions is characterized by an amplitude, mean, and standard deviation.

23. The method of claim 20, further comprising:

repeating the disposing, acquiring, modeling, processing, and mapping steps with respect to one or more further wellbores penetrating the subsurface formation; and

mapping the formation between the wellbores by interpolating between the respective wellbore-formation maps.

24. A method for acquiring subsurface formation data, comprising the steps of:

conducting logging operations in a plurality of wellbores penetrating a subsurface formation of interest so as to acquire a plurality of formation data sets, each of the acquired data sets representing a complex distribution;

modeling each of the complex distributions as a sum of discrete simple distributions; and

processing the simple distributions independently.

25. The method of claim 24, wherein the processing step comprises interpolating the simple distributions over the area between the plurality of wellbores so as to generate a 2D or 3D map of the simple distributions over at least a portion of the formation.

26. The method of claim 25, wherein the simple distributions are each representative of a specific formation property.

27. An apparatus for acquiring subsurface formation data, comprising:

a formation evaluation tool adapted for acquiring formation data while disposed in a wellbore penetrating a subsurface formation of interest, the formation data representing a complex distribution;

means for modeling the complex distribution as a sum of discrete simple distributions; and

means for independently processing the simple distributions to identify the simple distributions that are spurious.

28. The apparatus of claim 27, further comprising:

means for reconstructing the complex distribution by summing the simple distributions that are not spurious.

29. The apparatus of claim 27, further comprising:

means operatively connected to the formation evaluation tool for characterizing each of the simple distributions with a substantially reduced data set; and

means operatively connected to the formation evaluation tool for transmitting the substantially reduced data sets to the surface from the wellbore location.

30. The apparatus of claim 29, wherein:

the simple distributions comprise one or more statistical distributions; and

each of the statistical distributions is characterized by an amplitude, mean, and standard deviation.